FBAG Comments on URS Work Plan Dated February 6, 2012

Fields Brook Superfund Site, Ashtabula, Ohio

Introduction

Detrex has submitted a Work Plan (URS, 2012) to collect data for the design of a DNAPL recovery system at the Detrex Facility (Site), Operable Unit 5, of the Fields Brook Superfund Site in Ashtabula, Ohio. The Work Plan includes: an inspection of existing DNAPL recovery wells, installation of test trenches within the Former Lagoon Area, and a Membrane Interface Probe (MIP) investigation to define the extent of DNAPL in the northern portion of the Site (URS, 2012). The Work Plan also presents a brief discussion of the approach to be used for conducting DNAPL recovery pilot testing using existing and new recovery wells. US EPA has provided comments on the Detrex Work Plan (US EPA, 2012).

In November 2011, US EPA provided the Fields Brook Action Group (FBAG) a draft ESD for comment. The changes proposed as part of the ESD would have largely eliminated the active treatment portion of the remedy specified in the Record of Decision (ROD) for the Detrex Facility (US EPA, 1997), and would have replaced it with a remedy predicated on containment (URS, 2011). In contrast, the FBAG comments provided specific recommendations for designing, installing, and operating an effective DNAPL recovery system. As a result, US EPA decided to defer the proposed ESD in lieu of exploring additional measures that could enhance the treatment components of the ROD-required remedy, and thereby reduce the threat of DNAPL (a Principal Threat Waste) to Fields Brook or its tributaries. The proposed Work Plan is aimed at generating the data required to design an effective DNAPL recovery system. The following comments provide recommendations to improve the Work Plan, including identification and collection of the critical data needed to meet this objective.

General Comments

1. The FBAG agrees with US EPA's comment that the containment remedy previously proposed by Detrex (URS, 2011) and again alluded to in this work plan "...is not the best technical approach for recovering and removing DNAPL from the subsurface" (US EPA, 2012, p. 3). US EPA correctly points out that the necessary technical approach to addressing the DNAPL issues at the Site needs to focus on the recovery and removal of subsurface DNAPL. Removal and the subsequent treatment of the DNAPL is consistent with US EPA's policy on Principal Threat Waste as embodied in the ROD-defined remedy for the Site.
2. The proposed sequencing of the work (*i.e.*, MIP survey and then pilot test) is inappropriate and not cost-effective. The data needed to define the location of a pilot test is already available (*i.e.*, known areas where several feet of DNAPL accumulates in wells). Consequently, there is no need to conduct a MIP investigation now. Instead, Detrex should focus on installing a DNAPL recovery system in the known areas of greatest DNAPL thickness (*e.g.*, the former lagoon area) and then optimize and expand the system outward to neutralize the threat of ongoing migration of DNAPL. Once, a pilot test has been conducted and a system begins effectively recovering DNAPL, the spatial extent of recoverable DNAPL can be later defined, if needed.
3. The Detrex Work Plan is continuing to rely on approaches that have proven to be ineffective at the Site. For example, Detrex is planning to use existing DNAPL recovery wells, which were not properly designed and are prone to siltation. In addition, Detrex is continuing to propose data collection along the edges of the lagoons (*e.g.*, proposed trenches) instead of targeting the center of this known source area.

4. The FBAG also agrees with US EPA's numerous comments about the lack of specificity throughout the Work Plan. For example, the Work Plan does not provide crucial details regarding the depth of the proposed MIP investigation probes or the criteria to be used for identifying VOC impacts. In addition, the Work Plan does not provide details about the vacuum pumps and other equipment that will be used to conduct the pilot test. Given that the vacuum blower being utilized at the Site is not suitable for the local hydrogeology, it is critical that appropriate equipment (*i.e.*, a high vacuum, low air flow, pump; Gradient, 2011) be used to conduct the pilot test.

The specific comments provided below are offered to improve the proposed Work Plan and to identify site-specific features pertinent to the design and operation of a system that will effectively recover DNAPL from the source area using proven technologies and thereby reduce or neutralize the ongoing migration of Detrex DNAPL.

Detailed Comments

1. Detrex should conduct an appropriately designed DNAPL recovery pilot test in the known DNAPL accumulation areas (*i.e.*, areas where several feet of DNAPL has been observed in monitoring wells) rather than conducting an MIP investigation now. In addition, the recovery well designs and testing procedures presented in the Work Plan are either not appropriate for the Site or the Work Plan does not provide the specific design, operational, and monitoring details that are required for successful implementation of a DNAPL pilot test.

   (a) ***Detrex should not utilize existing DNAPL recovery wells, but instead install new properly designed wells***. Detrex is proposing to use its existing recovery well design and operational practices in its DNAPL recovery pilot test (URS, 2012, pp. 2-8 and 2-9). Existing Detrex recovery well designs and operational practices are deficient. For example, URS acknowledged that the initial recovery well design was inappropriate and resulted in excessive siltation, which led to the modification of the well design (URS, 2012, pp. 2-3):

   > "To reduce or eliminate excess silt build-up including DNAPL crystals in the well, the borehole diameter was increased to approximately 12-inches, and the screen size was decreased from 0.020 to 0.010 inches. In addition, the grain size of the well sand pack was reduced to allow less than 5% of the sand pack to pass through the screen."

   These well design and operational flaws (*e.g.*, intermittent operations) have led to the recurrent operational difficulties that past operators of the Detrex pilot system have reported, such as excessive well siltation, product crystallization, and emulsion formation. It is therefore counterproductive for Detrex to continue to utilize these deficient recovery wells and operational practices that have not been able to effectively remove DNAPL at the Site in 10 years of operations. Detrex should instead install multiple new recovery wells that are consistent with the FBAG-recommended design, including the recommended equipment, operational practices, and monitoring program described in the FBAG's prior comments.

   The Work Plan does not provide detailed design information for the proposed recovery wells and the drawings of the proposed wells (Figures 2-3 through 2-5) contain design inconsistencies or problems (as described in FBAG's prior comments on the ESD; Gradient, 2011). For example, Figure 2-4 is supposed to depict the FBAG-recommended design from prior comments on the ESD (Gradient, 2011). However, this figure shows elements that were not recommended by FBAG, including a large screened interval that extends above the water table. The FBAG's prior

comments recommended that the well screen be short, located in the same depth horizon as the DNAPL-bearing zone, and below the water table to prevent short circuiting of the vacuum pump.

(b) ***The DNAPL pilot recovery test should use equipment (i.e., type of vacuum pump) that is most appropriate for the Site conditions.*** The Work Plan does not specify the type of equipment to be used during the pilot test. On p. 2-11 of the Work Plan, Detrex proposes to use "dual-phase extraction system trailers that will be mobilized to the Site for the duration of the testing period," however it does not state what equipment is in the trailers and whether that equipment is appropriate for the site conditions and types of recovery wells being evaluated. In FBAG's previous comments on the ESD, an example of a state-of-the-art well design was provided, as well as the required equipment to operate such a well was specified (Gradient, 2011). The FBAG recommends that the Work Plan confirm that the term "high vacuum" reflects the ability to operate continually at vacuum of 25 inches Hg or greater, without shutdown.

(c) ***The Work Plan does not specify the duration of the pilot test.*** The Work Plan does not state the duration of system-design tests and it appears that Detrex plans to operate some wells intermittently. For example, on p. 2-8, the Work Plan lists four recovery well designs that it plans to evaluate and two of these designs specify intermittent operation.[1] As discussed in FBAG's previous comments, intermittent operation of the existing Detrex recovery wells has hindered DNAPL recovery and resulted in some of the recurrent operational difficulties that past operators of the Detrex pilot system have reported. During pilot tests, these unsuccessful operational practices should not be utilized, and instead, recovery wells should be operated continuously.

(d) ***The Work does not clearly define the data that will be collected and how the data will be utilized.*** During the test, the following data should be collected continuously:

- Measurements of vacuum pressure throughout the system, from the well head to the vacuum pump;
- Depth to water and depth to DNAPL in the recovery wells. This information, coupled with the vacuum pressure at the well head, will provide an indication of the total suction applied to the well;
- Depth to water and the depth to DNAPL in any wells within 200 feet of the extraction well;
- Flow rate of vapor and concentration of organic constituents in vapor extracted from the recovery wells;
- Flow rate of DNAPL as a separate phase (based on product pump discharge rates and collection of free product, which should be kept separate of water produced during extraction); and
- Concentration of organic materials in produced water to assess potential future treatment options.

These data can be used to assess the radius of influence (by evaluating distance-drawdown curves) of the recovery wells—a critical component that is missing in the Work Plan and that is paramount for designing and optimizing an effective DNAPL recovery system. Measurements of

[1] Later, on p. 2-10, the Work Plan only lists three well designs, with two of the three designs being operated intermittently. Detrex does not explain why the fourth option "DNAPL recovery wells utilizing other potentially applicable approaches based on the completed data evaluation" was dropped from consideration in the latter part of the report.

the flow rates of DNAPL, vapor, and groundwater (along with VOC concentrations in vapor and extracted groundwater) can be used to evaluate the total amount of DNAPL that is being extracted from the system. The continuous collection of this data will allow for an evaluation of how the system responds over time and can be used to determine when Site conditions reach equilibrium. An understanding of system performance at equilibrium will provide a basis for extrapolation of the pilot system to full scale. Care should be taken to evaluate Site response data (groundwater and DNAPL) for anisotropic conditions that might indicate preferential flow pathways resulting in migration of DNAPL away from the source area.

2. The Work Plan's proposal to manage contaminated soils at the Facility by creation of a DNAPL Soils Management Area is not consistent with the ROD, violates CERCLA's preference for permanent treatment, and would pose an impediment to future remedial efforts mandated by the ROD in the primary DNAPL source area. In addition, Detrex has not addressed the Land Disposal Restriction (LDR) requirements – an applicable or relevant and appropriate requirement (ARAR) – for the design, installation, and management of the Soils Management Area. Specifically, US EPA (2011) required Detrex to demonstrate that the "waste material must be controlled so as to pose no risk of migration." Given that the ROD for the Fields Brook Site required incineration of contaminated soils that contained compounds with a migration risk, defined as follows (US EPA, 2001):

   > "The liquid DNAPL and the DNAPL-impacted soils and sediment cannot be placed in the site landfill without treatment. According to the original 1986 Sediment ROD, material that contains contaminants with a high potential for mobility (with a soil/water partition coefficient of below 2400), should be incinerated on-site. The 1997 Sediment Operable Unit ESD changed that decision and moved the thermal treatment to an off-site incinerator, citing both an insufficient volume for cost-effective treatment on site and public concern."

   Since soils at the Detrex Facility also contain mobile compounds (chlorinated VOC have low soil/water partition coefficients), these compounds pose a migration risk and land disposal of such soils in the manner proposed by Detrex is not appropriate. Consequently, soils should be characterized and disposed of properly and should not be permanently stockpiled in the former lagoon area, as proposed by this latest Work Plan (URS, 2012).

3. Detrex's continued reliance on trenches is unclear, given that US EPA has clearly articulated that DNAPL removal, and not containment, is the appropriate remedial objective for the source area at the Site. In addition, the Detrex-proposed trench will not be effective in collecting the data needed for designing a DNAPL removal system, nor will it be beneficial as a recovery measure in itself. For example, as pointed out by US EPA, given the dimensions of the trench (*i.e.*, significant depth and narrow width) it will not be feasible to collect meaningful data about DNAPL presence or extent (comment #4, US EPA, 2012). Furthermore, an appropriately designed and operated DNAPL recovery well system is expected to be much more effective than a trench system in recovering and removing DNAPL from the sub-surface, so it is not clear what purpose the proposed trenches will serve. Consequently, Detrex should not install trenches, but instead use rotosonic drilling methods to evaluate the geology and DNAPL transport pathways in the lagoons, using these data to install DNAPL recovery wells and implement an effective pilot test to collect the data needed to design a full-scale DNAPL recovery system.

4. An investigation to fully define the extent of DNAPL at the Detrex Facility should be conducted after the DNAPL pilot test has been completed and a DNAPL recovery system begins operating. Furthermore, Detrex should utilize US EPA guidance in defining the DNAPL source area at the Facility, employ multiple lines of evidence recommended by US EPA guidance for conducting such evaluations (US EPA, 2009), and define the criteria that will be used to guide the selection of sample locations.

   (a) ***The Work Plan's characterization of the Detrex DNAPL source area is too "narrow" and not consistent with US EPA site characterization guidance (US EPA, 2009)***. The Work Plan's definition of the DNAPL "source area" only includes the former lagoon areas (URS, 2012, p. 2-1). This definition is inconsistent with US EPA guidance on source area characterization (US EPA, 2009), the DNAPL source area defined in the ROD (which extends beyond the former lagoon areas), and additional data collected since the ROD (*e.g.*, indications of DNAPL west of the slurry wall). In its guidance, US EPA states "The DNAPL source zone is the overall volume of the subsurface containing residual and/or pooled DNAPL" (US EPA, 2009). FBAG recommends that Detrex adopt US EPA's definition of a DNAPL source area, which is significantly larger than the former lagoon area.

   (b) ***Detrex should utilize US EPA guidance for defining the extent of the DNAPL source area***. The Work Plan does not state the criteria that will be used to determine the extent of chlorinated VOC impacts during the MIP investigation, but states that "if MIP results indicate that the extent on [sic] chlorinated VOC impacts have been delineated then planned boring outside of the delineated area may be eliminated from the investigation plan" (URS, 2012, p. 2-5). Because the Work Plan does not discuss its criteria for evaluating VOC impacts, it is not clear how decisions will be made regarding the elimination of borings from the investigation plan. US EPA guidance (2009) is clear that the lack of a detection in a downgradient sampling location is not evidence of the absence of DNAPL in the area investigated or beyond. This concept is especially important in complex heterogeneous environments, such as the fractured-clay setting at the Site.

   US EPA DNAPL guidance advocates source zone delineation be conservatively construed based on multiple lines of weighted evidence. Accordingly, if the MIP investigation is utilized, it should be implemented in its entirety and supplemented with further step-out points should positive VOC detections be recorded at the perimeter sampling points. Once complete, the MIP data needs to be evaluated along with the other lines of evidence (*e.g.*, including observations from the current investigation as well as those made previously, comparison of measured soil and groundwater concentrations to concentrations reflective of DNAPL) in drawing conclusions about source zone delineation.

5. The proposed technical meeting between Detrex, URS, and US EPA should not be utilized as the mechanism for final decision making regarding the proposed recovery well pilot tests. Detrex should prepare a detailed recovery well design and operation document, as outlined above, that clearly defines well construction details for the proposed recovery wells, equipment to be utilized for the different well designs, data that will be collected during pilot tests, the frequency at which data will be collected, and how the collected data will be used to optimize performance of the pilot system. US EPA (with support from the FBAG) should have the opportunity to provide comments on the design document prior to installation and testing of the pilot DNAPL recovery system.

References

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